

Remarks:

Reconsideration of the application is requested.

Claims 1-7 remain in the application. Claim 1 had been amended. A marked-up version of the claim is attached hereto on a separate page.

In the first paragraph on page 2 of the above-mentioned Office action, claims 1 and 4-7 have been rejected as being fully anticipated by Mang et al. (U.S. Patent No. 5,692,279), Yamada et al. (U.S. Patent No. 6,271,619 B1), or Carson et al. (U.S. Patent No. 5,160,870) under 35 U.S.C. § 102.

Regarding the Yamada et al. reference, as stated in the response dated December 21, 2001, it is again noted that the Yamada et al. PCT Publication date is subsequent to the applicant's priority date and therefore is unavailable to be cited against the instant application. A certified translation of the priority document to perfect applicants' claim for priority was included with the response dated December 21, 2001.

In the second paragraph on page 2 of the Office action, claim 2 has been rejected as being obvious over Mang et al. (U.S. Patent No. 5,692,279), Yamada et al. (U.S. Patent No.

6,271,619 B1), or Carson et al. (U.S. Patent No. 5,160,870) in view of Arvanitis (U.S. Patent No. 4,642,505), Fujita et al. (U.S. Patent No. 4,638,205), or Von Dach (U.S. Patent No. 4,562,370) under 35 U.S.C. § 103.

In the third paragraph on page 2 of the Office action, claim 3 has been rejected as being obvious over Mang et al. (U.S. Patent No. 5,692,279), Yamada et al. (U.S. Patent No. 6,271,619 B1), or Carson et al. (U.S. Patent No. 5,160,870) in view of Tajima et al. (U.S. Patent No. 6,114,795), Ochiai (U.S. Patent No. 4,447,753), or Kawashima (U.S. Patent No. 4,484,382) under 35 U.S.C. § 103.

The rejections have been noted and the claims have been amended in an effort to even more clearly define the invention of the instant application. Support for the changes is found on page 7, lines 15-21 of the specification.

Before discussing the prior art in detail, it is believed that a brief review of the invention as claimed, would be helpful.

Claim 1 calls for, inter alia:

"an additional layer disposed on said upper electrode layer, said additional layer being structured with etching structures

for setting a prescribed resonant frequency of the piezoelectric resonator."

The Mang et al. reference discloses a monolithically formed thin film resonator comprising a lower electrode (22) and an upper electrode (24), a piezoelectric layer (25) disposed between an upper and lower electrode, and a film (27) which rests on the upper electrode (24) to alter the resonance frequency of the resonator (column 4, lines 59-63). Mang et al. teach the frequency is set by changing the thickness of layer (27) (column 5, lines 1-6).

The reference does not show an additional layer disposed on the upper electrode layer that is structured with etching structures for setting a prescribed resonant frequency of the piezoelectric resonator, as recited in claim 1 of the instant application. Mang et al. teach that the frequency is set by changing the thickness of layer (27) (column 5, lines 1-6). This is contrary to the invention of the instant application, in which the additional layer is patterned with etching structures for setting a prescribed frequency of the piezoelectric resonator. Furthermore, the structures are preferably distributed with a uniformity that is sufficient to effect a uniform change in the mass of the layer per area (area density), thus producing a specific setting of the resonant frequency/ frequencies. On the other hand, the

structures are preferably distributed so irregularly that diffraction effects are avoided.

Regarding the rejection of claims 1 and 4-7 over Carson et al. (U.S. Patent No. 5,160,870) under 35 U.S.C. § 102, it is noted that the Carson et al. reference discloses an ultrasonic image-sensing array comprising a plurality of ultrasonic transducer elements all of which are working in the frequency range between 2 and 20 MHz. To this end the piezoelectric layer (15) is between 20 and 1000 μm thick (column 7, lines 43-46), which is much thicker than the typical thickness of the piezoelectric layer of a thin film resonator. Carson et al. also disclose that the transducers when used as an image sensor shall be responsive to a broad range of frequencies (column 4, lines 38-40).

The reference does not show an additional layer disposed on the upper electrode layer that is structured with etching structures for setting a prescribed resonant frequency of the piezoelectric resonator, as recited in claim 1 of the instant application. Carson et al. do not disclose an additional structured layer, and it is of no use to tune the frequency of each transducer. This is contrary to the invention of the instant application, in which the additional layer is patterned with etching structures for setting a prescribed frequency of the piezoelectric resonator. Furthermore, the

structures are preferably distributed with a uniformity that is sufficient to effect a uniform change in the mass of the layer per area (area density), thus producing a specific setting of the resonant frequency/ frequencies. On the other hand, the structures are preferably distributed so irregularly that diffraction effects are avoided.

It is accordingly believed to be clear that none of the references, whether taken alone or in any combination, either show or suggest an additional layer disposed on the upper electrode layer that is structured with etching structures for setting a prescribed resonant frequency of the piezoelectric resonator, as recited in claim 1 of the instant application. Claim 1 is, therefore, believed to be patentable over the art and since all of the dependent claims are ultimately dependent on claim 1, they are believed to be patentable as well.

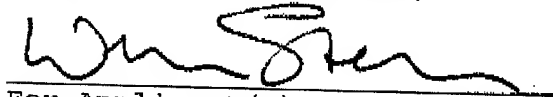
The additional references do not make up for the deficiencies of Mang et al. or Carson et al.. The additional references disclose providing "islands of added material to adjust frequency. Therefore the additional references would not lead to the additional layer being structured with etching structures as claimed in the invention of the instant application.

In view of the foregoing, reconsideration and allowance of claims 1-7 are solicited.

In the event the Examiner should still find any of the claims to be unpatentable, counsel respectfully requests a telephone call so that, if possible, patentable language can be worked out.

Please charge any other fees which might be due with respect to Sections 1.16 and 1.17 to the Deposit Account of Lerner & Greenberg P.A., No. 12-1099.

Respectfully submitted,



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Marked-up version of the claims:

Claim 1 (amended). A thin film piezoelectric resonator,
comprising:

a lower electrode layer and an upper electrode layer;

a piezoelectric layer between said lower electrode layer and
said upper electrode layer;

an additional layer disposed on said upper electrode layer,
said additional layer [having a structure] being structured
with etching structures for setting a prescribed resonant
frequency of the piezoelectric resonator.